GDCVRR1205AP 3.3-5V 2A (15V) Variable Output Switching Voltage Regulator LDO Replacement

1. Features

- Replaces typical TO-220 Linear Voltage regulators pin-for-pin (pins 1 – 3 only)
- Input voltage range 3V to 15V
- Selectable voltage between 1.2 and 5V using single through-hole resistor
- Output Current up to 2A
- Dynamically adjusts for light and heavy loads ensuring maximum efficiency
- >90% efficiency at higher loads and up to 84% for light loads

2. Applications

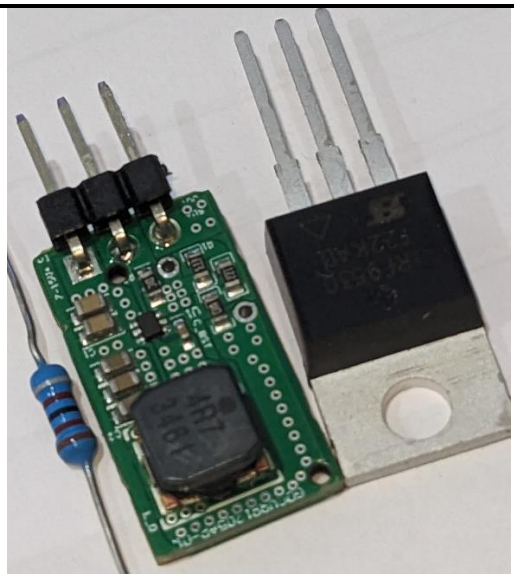
- Microcontroller power supply
- IC Logic power
- Drone and RC applications

3. Description

The GDCVRR1205 buck converter is designed to be a pin-for-pin replacement for positive linear voltage regulators (LDOs). These regulators are based on the Diode Incorporated AP62200 providing step down voltage from between 2.6V to 15V down to between 1.2V and 5V. The converter supports moderately high current throughput for demanding applications typically without needing thermal management. No external components are required to support the unit. With low and high power operating modes, the unit will maximize efficiency by switching frequency modes as load demands.

The device is optimised for 12V source and 5V output however will operate much more efficiently than an equivalent LDO at all supply and output voltages.

5. Simplified Schematic

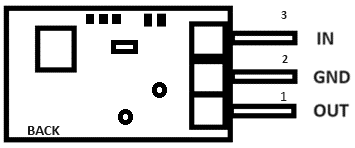


Efficiency is effected by output current and input voltage with typical efficiency well above 80% across the supported range.

4. Device Information

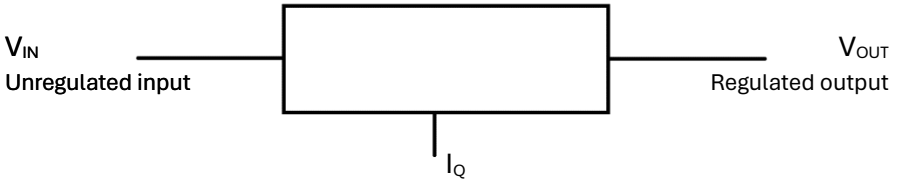
Dimensions mm (+/- 0.1)		
Width	Height (excluding pins)	Depth (max)
11.2	19.9	6.25

5. Pin Configurations



PIN Outs		
Name	#	Function
OUT	1	Filtered/regulated output voltage
GND	2	Ground
IN	3	Unregulated voltage (50V max) (must be 2V+ higher than OUT)

NOTE: take care with pin outs – pins may be in reverse order than is expected.



6. Specifications

Absolute Maximum Ratings

Specification	MIN	MAX	UNIT
Input Voltage	4.2	20V	V
Output Voltage	1.2	5	V
Continuous Output Current	-	2	A
Operating junction temperature (T_J)	-	160	°C
Storage Temperature(T_{stg})	-65	150	°C

Recommended Ratings

Specification	MIN	MAX	UNIT
Input Voltage	4.2	15	V
Output Voltage	1.2	5	V
Continuous Output Current	-	1.5	A
Operating junction temperature (T_J)	0	100	°C
Storage Temperature(T_{stg})	-65	150	°C

7. Detailed Schematic

The GDCVRR1205AP detailed schematic in Figure 2 is adapted from the Diode Incorporated recommended configuration. The unit is optimised for 12V input and 5V output.

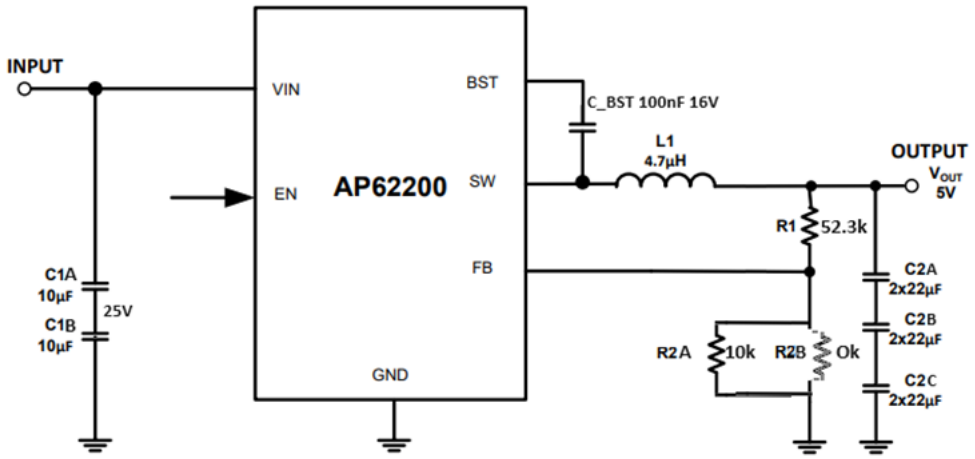
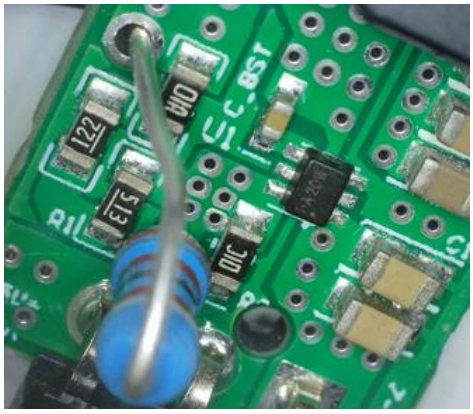
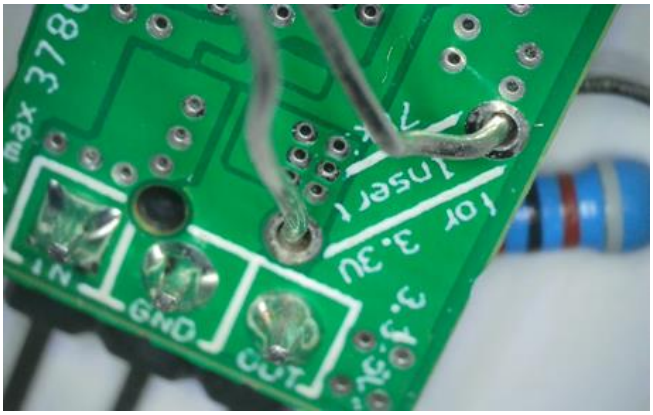


Figure 2 - Detailed Schematic

8. Output Voltage Adjustment.

The GDCVRR1205AP can be configured for any output voltage between 1.2 and 5V. The output voltage adjustment is achieved soldering a suitable resistor at the empty footprint (R2B) located near the output pin. For most 3.3V applications an 82kOhm resistor supplying 3.33V is recommended.





R1 and R2 form a voltage divider that adjusts the output voltage of the AP62200. R1 is fixed at **52.3k**Ohms and R2A is fixed at **10k**Ohm. R2B forms a resistor in parallel with R2A and figures 3 and 4 show the relationship between R2 and output voltage. The influence of R2 is logarithmic, so refer to figure 3 for voltages below 3.5V and figure 4 for voltages above 3.5V.

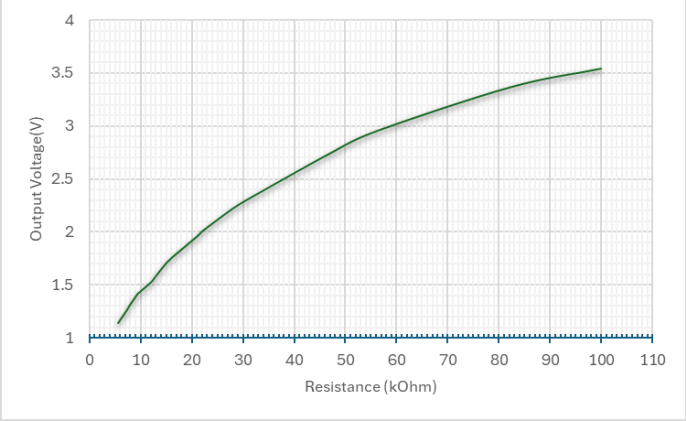


Figure 3 Output Voltage vs R2 0-100kOhm

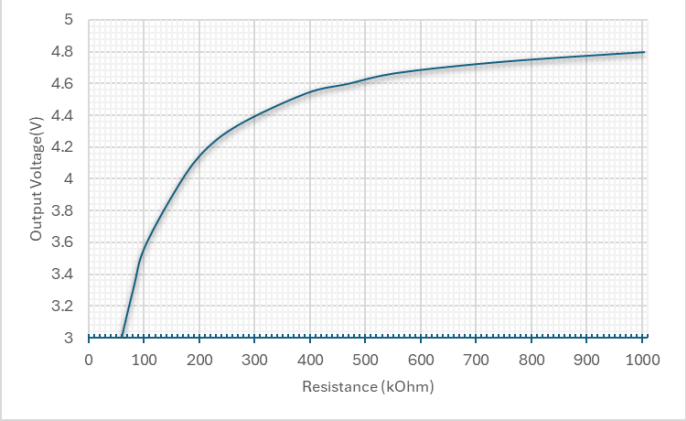


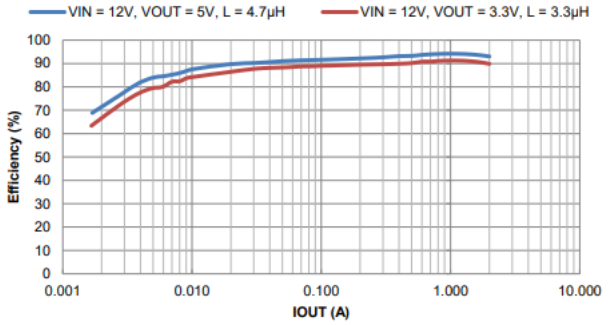
Figure 4 Output Voltage vs R2 100-1000kOhm

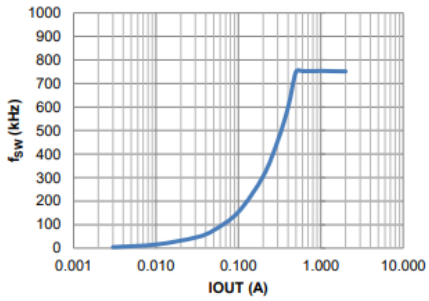
Resistor kΩ	Output Voltage
4.7	Too Low
5.6	1.19
6.8	1.28
8.2	1.45
10	1.54
12	1.6
15	1.7
18	1.85
22	2
27	2.2
33	2.35
39	2.54
47	2.75
56	2.95
68	3.15

Resistor kΩ	Output Voltage
82	3.34
100	3.52
120	3.68
150	3.9
180	4.08
220	4.25
270	4.31
330	4.44
390	4.52
470	4.6
560	4.68
680	4.71
820	4.73
1000	4.8

9. Typical Efficiency

The efficiency of the GDCVRR1205AP is dependent heavily on the output voltage and the load current. Swith mode power supplies are far less efficient at lower loads. The GDCVRR1205AP employs the AP662200 buck converter which will dynamically adjust the operating mode to maximise the efficiency as load reduces achieving greater than 80% efficiency over the recommended operating range.

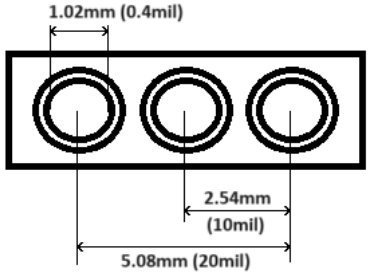




The AP62200 operates in COT (Constant On Time) mode for higher loads and will switch to PFM (Pulse Frequency Modulation) mode for lighter loads to ensure the most efficient output. In PFM mode, the switching frequency will reduce automatically as load decreases.

10. Footprint

The AP62200 uses a standard TO-220 footprint.



11. References

Please refer to the Diodes Incorporated *AP62200/AP62201/AP62200T 4.2 to 18V Input 2A Low IQ Synchronous Buck Converter* datasheet at **diodes.com** for detailed information about the AP662200 Buck converter.